050198

FLOOD INSURANCE STUDY

CITY OF GREENWOOD, ARKANSAS
SEBASTIAN COUNTY

OCTOBER 15, 1980

federal emergency management agency
federal insurance administration

COMMUNITY NUMBER - 050198

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
CITY OF GREENWOOD, ARKANSAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Greenwood, Sebastian County, Arkansas, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the City of Greenwood to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 24 CFR, 1910.1 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Geological Survey for the Federal Insurance Administration, under Interagency Agreement No. IAA-H-9-77 Project Order No. 26, Amendment No. 1. This study which was completed in November 1978, covered all significant flooding sources in the City of Greenwood. Approximate flood boundaries for Heartsill Creek were determined in February 1976, by Michael Baker, Jr., Inc., under contract to the Federal Insurance Administration. The Arkansas State Highway and Transportation Department provided base maps for the City of Greenwood.

1.3 Coordination

Streams requiring detailed study were identified at a meeting attended by representatives of the Geological Survey, FIA, Arkansas Division of Soil and Water Resources, City of Greenwood, and local businessmen in May 1977. Results of the hydrologic analyses were coordinated with the U.S. Department of Agriculture, Soil Conservation Service (SCS).

On March 26, 1980, the results of the study were reviewed at the final meeting attended by a representative of the study contractor, FIA, and community officials. The study was acceptable to the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Greenwood. The area of study is shown on the Vicinity Map (Figure 1).

The limits of detailed and approximate studies in Greenwood were determined by FIA with community and study contractor consultation at the meeting in May 1977.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through November 1983. These areas include Vache Grasse Creek, Heartsill Creek to the corporate limit at W. Denver St., Hester Creek, and Adamson Creek adjacent to the corporate limit.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by FIA, and the City of Greenwood.

2.2 Community Description

The City of Greenwood is located in western Arkansas near the Arkansas-Oklahoma State line in central Sebastian County. Fort Smith lies approximately 18 miles northwest of the town. The City of Greenwood is a residential community which has grown from a population of 1,558 persons in 1960 to 2,466 persons in 1977.

The City of Greenwood is located entirely within the Vache Grasse drainage area. As shown on the vicinity map (Figure 1), most of the developed part of the City of Greenwood is drained by Heartsill and Hester Creeks which join in the western part of the city and flow eastward to a junction with Vache Grasse Creek. Topographic relief in the City ranges from moderately hilly in the residential areas to flat or nearly flat in the Vache Grasse flood plain. Land surface elevations range from 490 to 550 feet above National Geodetic Vertical Datum of 1929 (NGVD).

Extensive coal deposits which underlie the area in and around the City of Greenwood have led to mining activities several times in the past. Most of the mining was done prior to and during World War II, although some mining was done in (1978). Large spoil banks remain in the Vache Grasse flood plain northeast of the community as a result of strip mining

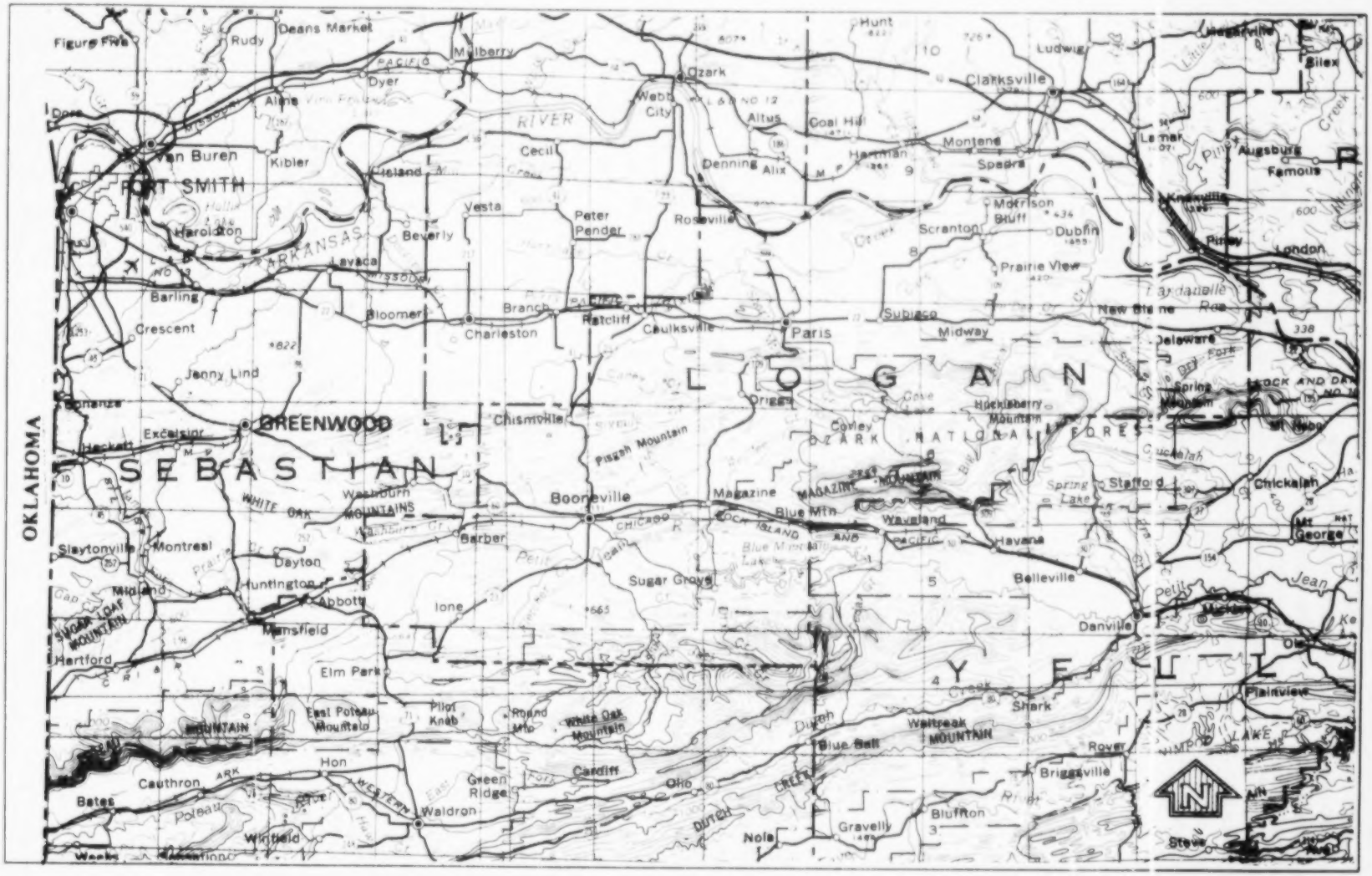


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF GREENWOOD, AR

[SEBASTIAN CO.]

APPROXIMATE SCALE

8 0 8 16 24 MILES

VICINITY MAP

in the area. The banks are as much as 30 feet high and extend northeastward from the east edge of the City across Vache Grasse Creek flood plain. The banks have been cut in several places by removal of spoil material for fill elsewhere. Vache Grasse Creek follows the natural channel, undisturbed during the mining process, through the spoil banks.

2.3 Principle Flood Problems

Principle flood problems in Greenwood are associated with the temporary loss, during periods of high water, of land along Vache Grasse Creek for agricultural use.

2.4 Flood Protection Measures

Except for a drainage ditch on a short reach of Hester Creek adjacent to the Greenwood Estates Subdivision, there are no flood protection structures or flood retarding structures within the community.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, and 500-year period (recurrence intervals), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

Since there are no stream-flow records for any of the steams under study, peak discharges for floods of 10-year, 50-year, and 100-year recurrence intervals were determined from a regional regressional analysis described in WRC 11, Floods in Arkansas, Magnitude and Frequency Characteristics through 1968 (Reference 1). The regression is based on a determination of the relationship of drainage area and channel slope to the desired discharge at regular gaging stations throughout the state and extending these relationships to ungaged sites. The peak discharges computed for the Vache Grasse mainstem were assigned to the tributary streams in the study area in proportion to their drainage areas.

Discharge for the 500-year flood was determined by straight-line extrapolation of a log-probability graph of flood discharges for frequencies up to 100 years.

The peak discharge-drainage area relationships for the selected recurrence intervals are presented in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
VACHE GRASSE CREEK					
Downstream corporate limits	43.6	10,100	18,400	21,300	31,000
HEARTSILL CREEK					
At mouth	9.5	2,200	4,100	4,700	6,800
Upstream from Hester Creek	4.2	1,100	2,000	2,300	3,300
HESTER CREEK					
At mouth	5.0	1,100	2,100	2,400	3,500
ADAMSON'S CREEK					
Upstream from Heartsill Creek	7.3	1,700	3,100	3,600	5,200

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the flood sources.

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the Geological Survey's Step-Backwater Computer Program E-431 (Reference 2). Cross sections for the backwater analyses of the streams studied were field surveyed and sections were located at close intervals above and below bridges in order to compute the significant backwater effects of these structures. All bridges were surveyed to obtain elevation data and structural geometry. Additional cross sections were determined at intermediate locations as required to define the profiles. Particular emphasis was placed on the location of profiles through the spoil banks northeast of the city to determine their backwater effect, if any. Locations of selected cross sections within the study area used in the hydraulic analyses are shown on the flood profiles.

Starting water-surface elevations for profiles on Vache Grasse were determined through use of techniques described in Water Resources Summary numbers 12 and 13 (References 3 & 4). Starting water-surface elevations for profiles on Heartsill and Hester Creeks were taken from computed elevations at cross sections located immediately downstream from the mouth of Heartsill and Hester Creeks respectively.

Roughness coefficients (Manning's "n") for all of the streams were estimated by field inspections of the cross sections. Channel "n" values varied from 0.040 to 0.055 and overbank values varied from 0.032 to 0.065.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.1 foot for floods of the selected recurrence intervals (Exhibit 1). All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD of 1929). Elevation reference marks used in this study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:62;500 with a contour interval of 20 feet (Reference 5). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For the streams studied by approximate methods, the boundary of the 100-year flood was taken from previous FIA determinations.

The boundaries of the 100- and the 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding. Owing to limitations of the map scale and/or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways presented in this study were computed on the basis of consideration of existing channel configurations and for maintaining reasonable velocities in floodways.

Because Vache Grasse and Heartsill Creeks occupy separate channels along the flanks of the flood plain within the corporate limits an attempt was made to define individual floodways for each of the streams. Analysis for Vache Grasse Creek alone indicates that because of the flow characteristics of the Highway 96 Bridge over Vache Grasse Creek, a majority of the intervening land between the creeks would be required for a floodway having the allowable surcharge. Also, the scheme would produce excessively high velocities through the bridge. Therefore, in spite of the fact that a reasonable floodway could be designed for the Adamson-Heartsill Creek channel, floodway limits for these streams were placed at or near the uphill side of each channel and the intervening land left in the floodway. In order to minimize velocities, essentially no encroachment was allowed on Heartsill Creek for a distance upstream from the Highway 105 Crossing where the channel is presently constricted. Analysis indicates that the drainage channel on Hester Creek adjacent to Greenwood-West Subdivision is adequate to carry the 100-year flood. Thus, no encroachment was allowed for the channeled portion of Hester Creek. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Vache Grasse								
A[2]	127,800	1,793	8,294	2.6	483.1	483.1	483.2	0.1
B[2]	129,100	1,400[3]	5,012	4.3	483.9	483.9	484.2	0.3
C	130,600	1,550[3]	6,810	3.1	485.5	485.5	486.2	0.7
D	130,950	1,975	12,436	1.7	488.0	488.0	488.2	0.2
E	131,600	1,900	8,574	2.5	488.1	488.1	488.3	0.2
F	133,900	3,079[3]	5,356	3.1	490.0	490.0	490.2	0.2
Heartsill Creek								
A	2,000	370	1,787	2.6	489.7	489.7	490.4	0.7
B	2,725	100	564	8.3	490.7	490.7	491.5	0.8
C	3,100	120	947	5.0	495.0	495.0	495.1	0.1
D	3,500	60	344	13.7	495.9	495.9	495.9	0.0
E	4,600	180	1,310	3.6	504.1	504.1	504.5	0.4
F	5,700	200	1,139	1.9	505.0	505.0	506.0	1.0
G	6,300	150[3]	638	3.5	505.8	505.8	506.2	0.4
Hester Creek								
A	375	129	897	2.7	506.2	506.2	506.2	0.0
B	1,975	90	460	5.2	506.7	506.7	506.9	0.2

[1]Feet above mouth
[2]Outside corporate limits, not shown on map
[3]Floodway extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

THE CITY OF GREENWOOD, AR
(SEBASTIAN COUNTY)

FLOODWAY DATA

VACHE GRASSE CREEK-HEARTSILL CREEK-HESTER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Adamson's Creek								
A	135,420	1,049[2]	2,258	1.6	492.2	492.2	492.4	0.2
B	136,720	200[3]	443	8.1	494.8	494.8	494.8	0.0
C	136,780	250[3]	995	3.6	496.5	496.5	496.5	0.0
D	137,380	210[2]	824	4.4	497.9	497.9	498.0	0.1

[1]Feet above mouth of Vache Grasse Creek
[2]Floodway extends beyond corporate limits
[3]Floodway lies outside corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

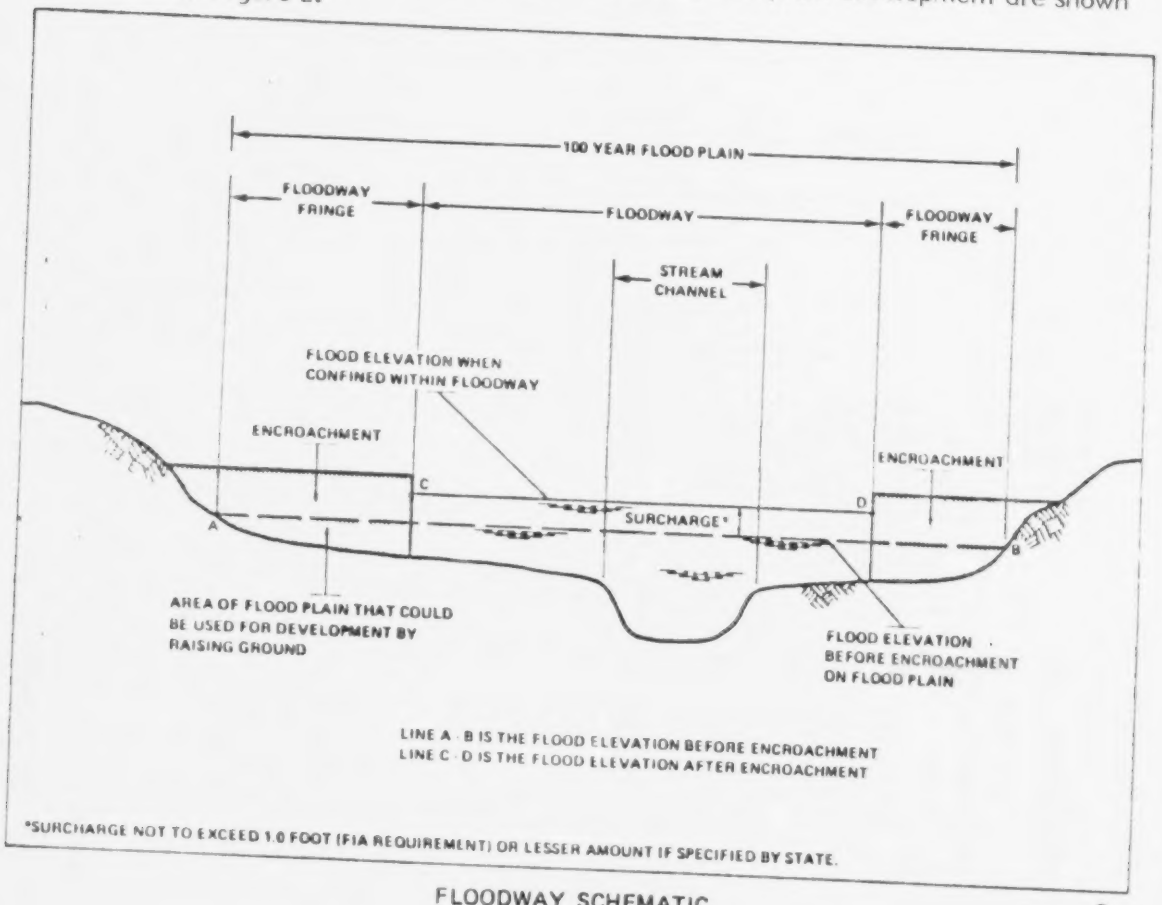
THE CITY OF GREENWOOD, AR
(SEBASTIAN COUNTY)

FLOODWAY DATA

ADAMSON'S CREEK

As shown on the Flood Boundary and Floodway Map, the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown. A portion of the floodway of Vache Grasse Creek and Hester Creek is outside of the corporate limits.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
A
B
SURCHARGE*
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC

Figure 2

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting the City of Greenwood.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot

Six reaches meeting the above criteria were required for the flooding sources of the City of Greenwood. These include two reaches on Vache Grasse Creek, and Heartsill, and one each on Hester and Adamson's Creeks. The locations of the reaches are shown on the flood profiles.

5.2 Flood Hazard Factors (FHFs)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between the water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, the accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the City of Greenwood was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A2, A3, A4, A5:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevation for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Greenwood is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Vache Grasse Creek							
Reach 1	0005	-1.6	-0.3	+0.8	015	A3	Varies
Reach 2	0005	-1.9	-0.6	+1.4	020	A4	Varies
Heartsill Creek							
Reach 1	0005	-1.4	-0.4	+1.4	015	A3	Varies
Reach 2	0005	-2.5	-0.5	+1.4	025	A5	Varies
Hester Creek							
Reach 1	0005	-2.7	-0.7	+1.7	025	A5	Varies
Adamson's Creek							
Reach 1	0005	-1.1	-0.3	+1.0	010	A2	Varies

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT – SEE MAP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

THE CITY OF GREENWOOD, AR

(SEBASTIAN COUNTY)

FLOOD INSURANCE ZONE DATA

VACHE GRASSE CREEK–HEARTSILL CREEK–HESTER CREEK–ADAMSON'S CREEK

6.0 OTHER STUDIES

The Soil Conservation Service is currently planning an enlargement of Greenwood Reservoir located on Vache Grasse Creek upstream from the community. The reservoir will be used primarily as a source of water supply for Greenwood but the proposed design includes some reservoir storage for flood control. The project is currently authorized for planning and will require several years before actual construction can begin.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Federal Emergency Management Agency, Federal Center, Denton, Texas 76201.

8.0 BIBLIOGRAPHY AND REFERENCES

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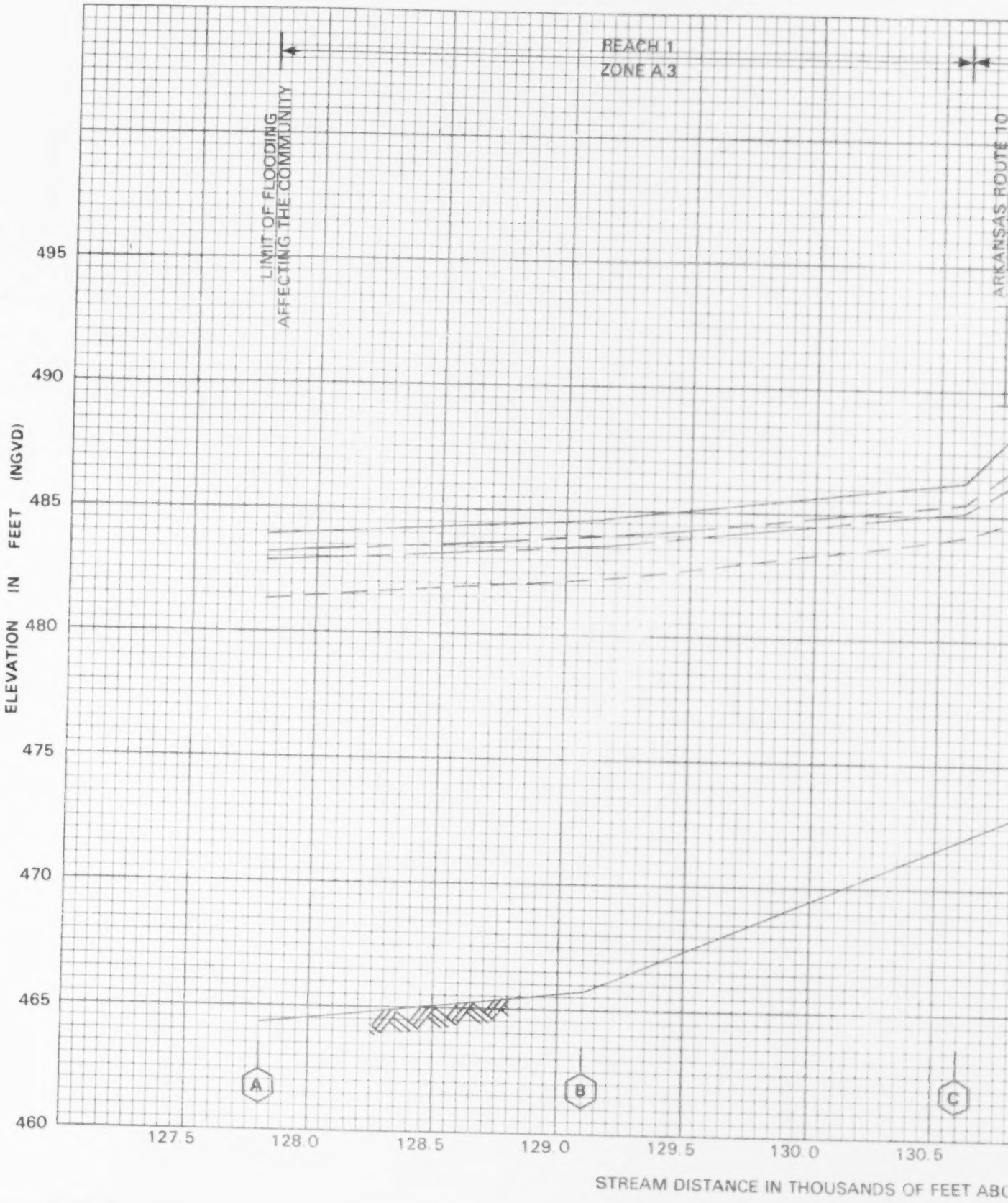
2. Shearman, James O., Computer Program E-431, Computer Applications for Step-Backwater and Floodway Analyses, U.S. Geological Survey Open-File Report 76-499, 1976.

3. Hines, M.S., 1977, Graphs for Determining the Approximate Elevation of the 50-year Flood in Arkansas, Arkansas Geological Commission, Water Resources Summary 12.

4. ----------, 1978, Graphs for Determining the Approximate Elevation of the 100-year Flood In Arkansas, Arkansas Geological Commission, Water Resources Summary 13.

5. U.S. Department of the Interior, Geological Survey, 7.5 Minute Series (Topographic) Maps, Scale 1:24,000, Contour Interval 20 feet: Burnville, 1951 and Greenwood, 1951.


REACH 1
ZONE A3
LIMIT OF FLOODING
AFFECTING THE COMMUNITY
ARKANSAS ROUTE 10
ELEVATION IN FEET (NGVD)
495
490
485
480
475
470
465
460
127.5
128.0
128.5
129.0
129.5
130.0
130.5
A
B
C
STREAM DISTANCE IN THOUSANDS OF FEET ABO

REACH 2
ZONE A4

CONFLUENCE OF HEARTSILL CREEK

CONFLUENCE OF ADAMSON CREEK

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

50 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

CROSS SECTION LOCATION

D

E

A

131.0 131.5 132.0 132.5 133.0 133.5

VE MOUTH

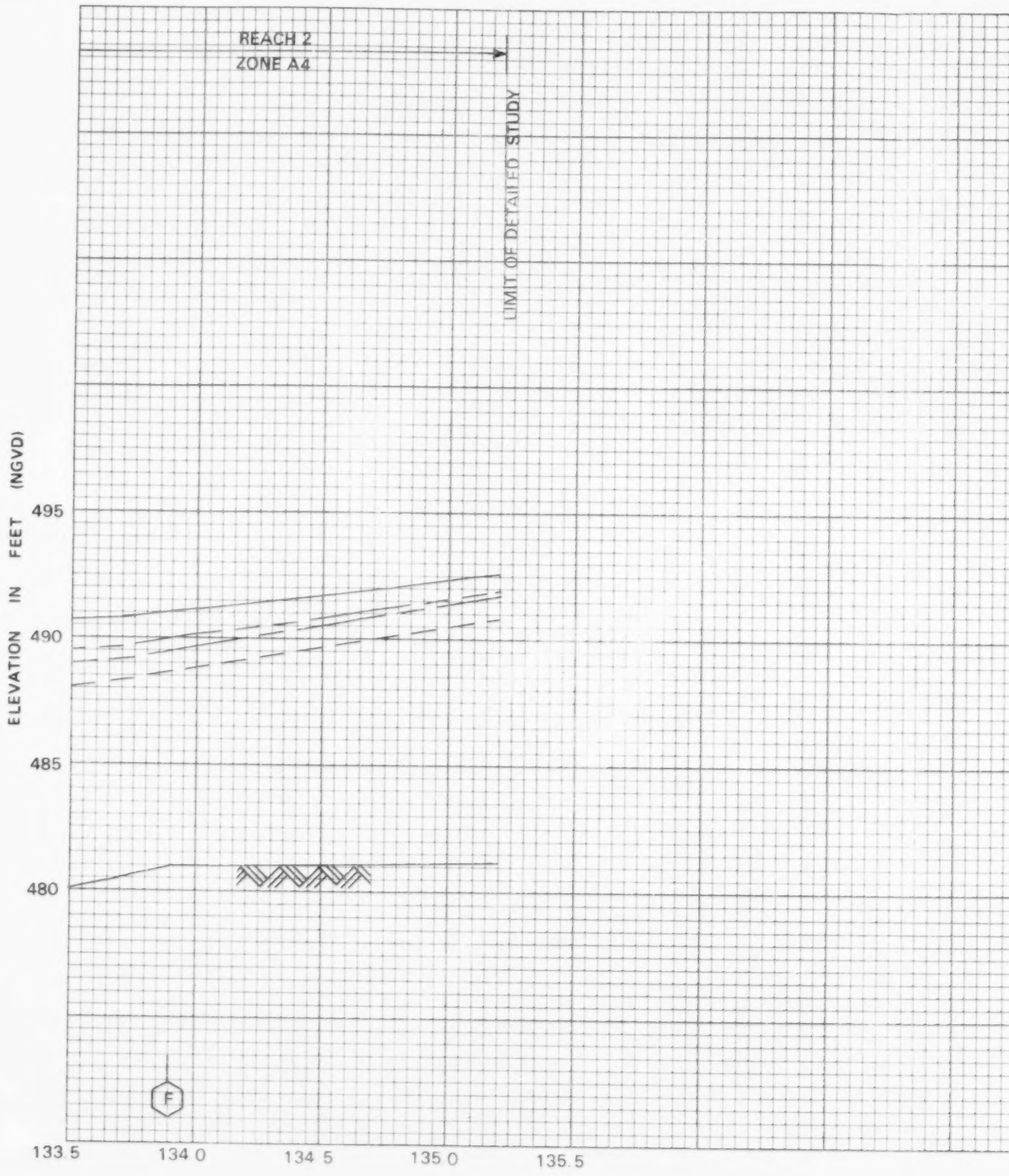
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF GREENWOOD, AR.
(SEBASTIAN COUNTY)

FLOOD PROFILES

VACHE GRASSE CREEK

01P


REACH 2
ZONE A4
LIMIT OF DETAILED STUDY
ELEVATION IN FEET (NGVD)
495
490
485
480
F
133.5
134.0
134.5
135.0
135.5
STREAM DISTANCE IN THOUSANDS OF FEET AB

OVE MOUTH

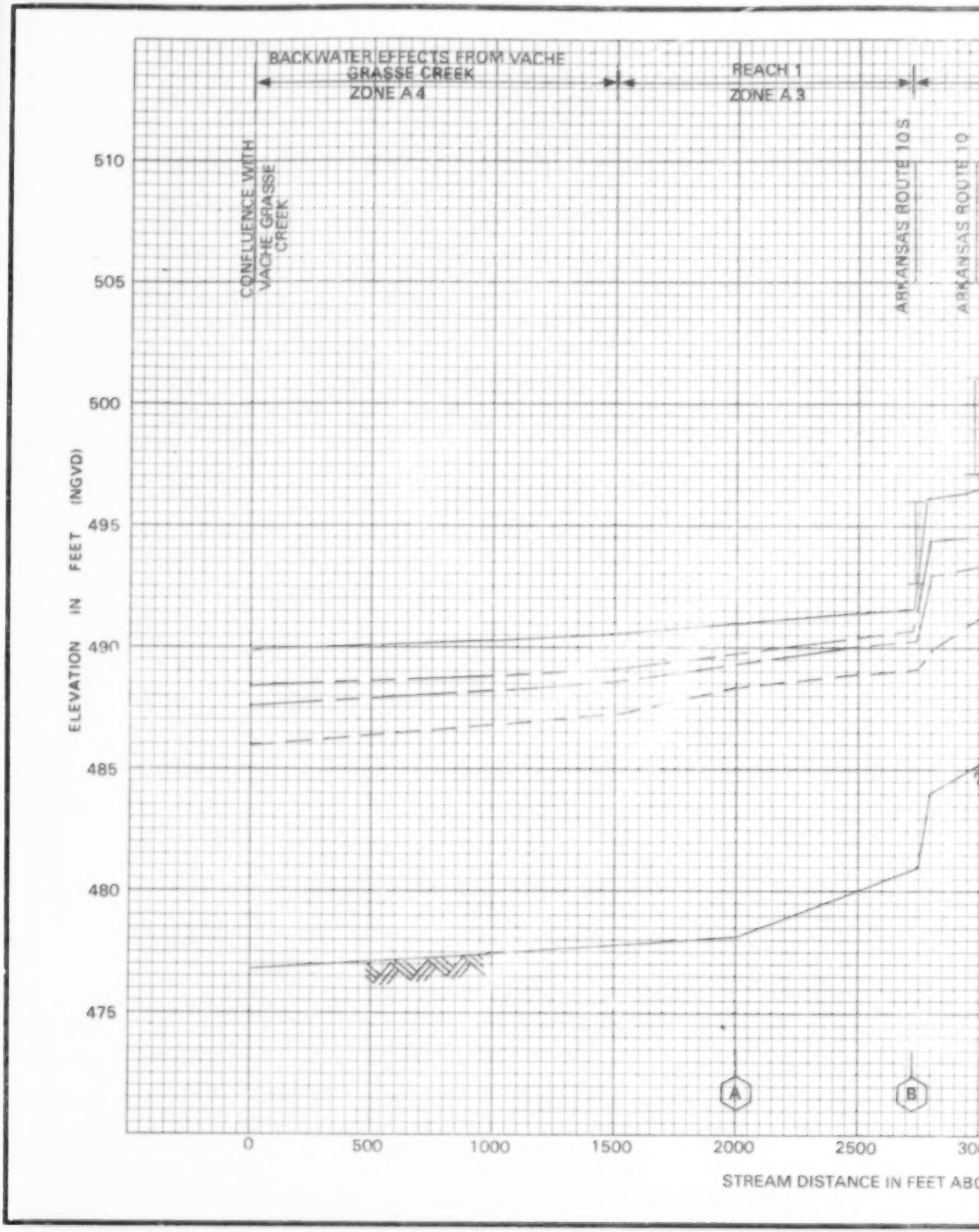
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

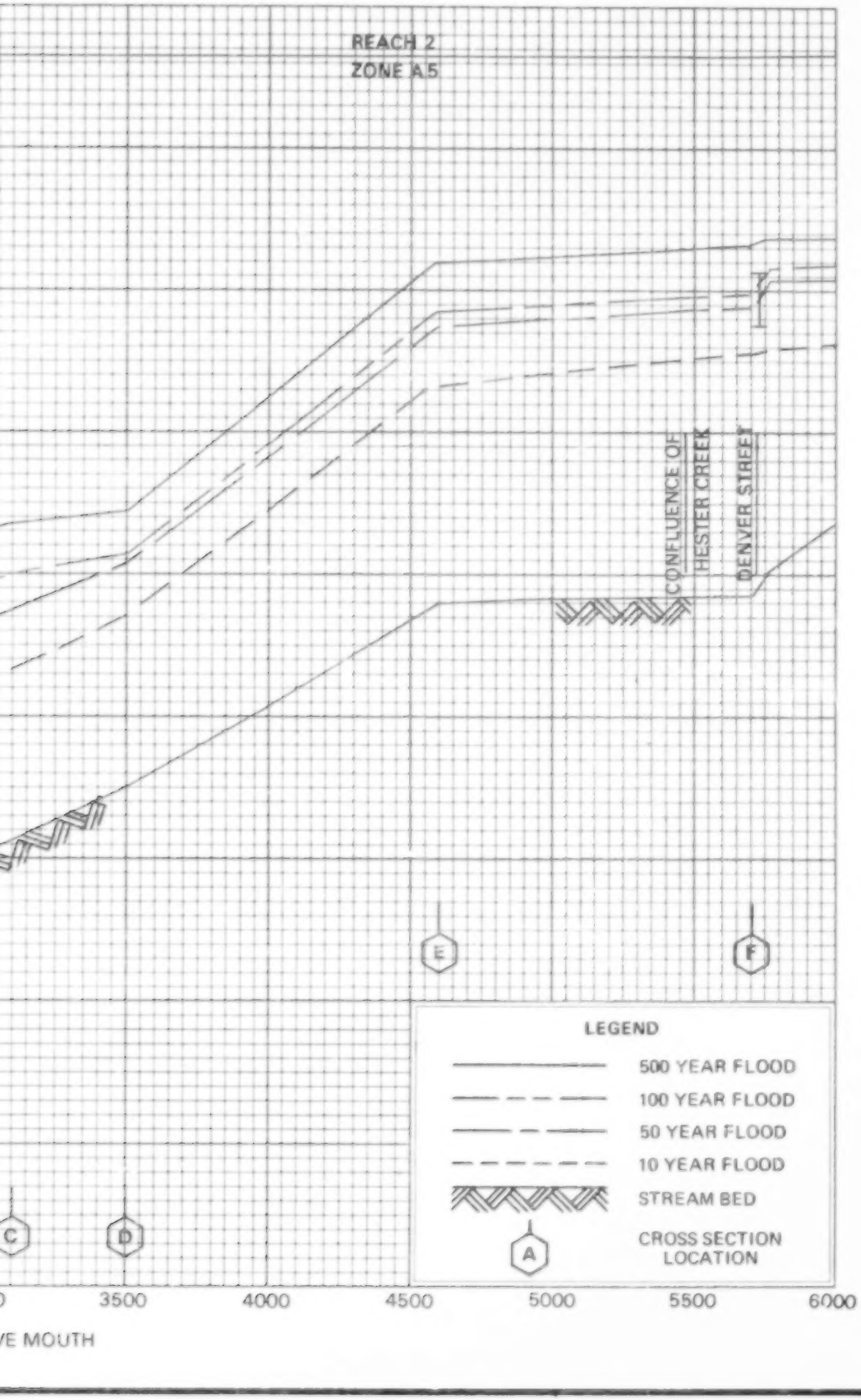
CITY OF GREENWOOD, AR.
(SEBASTIAN COUNTY)

FLOOD PROFILES

VACHE GRASSE CREEK

02P


BACKWATER EFFECTS FROM VACHE GRASSE CREEK
ZONE A 4
REACH 1
ZONE A 3
CONFLUENCE WITH VACHE GRASSE CREEK
ARKANSAS ROUTE 10 S
ARKANSAS ROUTE 10
ELEVATION IN FEET (NGVD)
510
505
500
495
490
485
480
475
A
B
0
500
1000
1500
2000
2500
STREAM DISTANCE IN FEET ABO



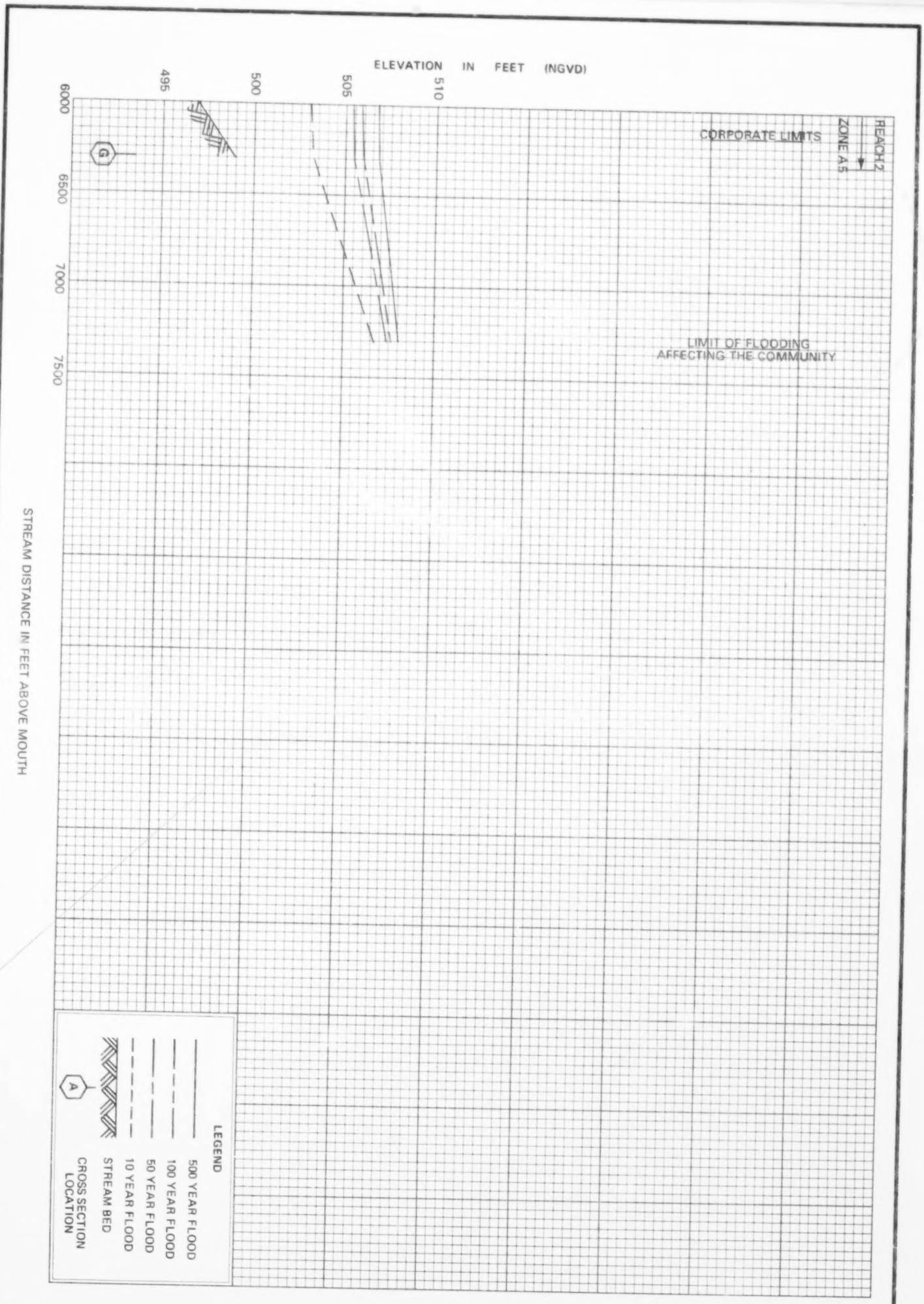
FLOOD PROFILES

HEARTSILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF GREENWOOD, AR
(SEBASTIAN CO.)

03P



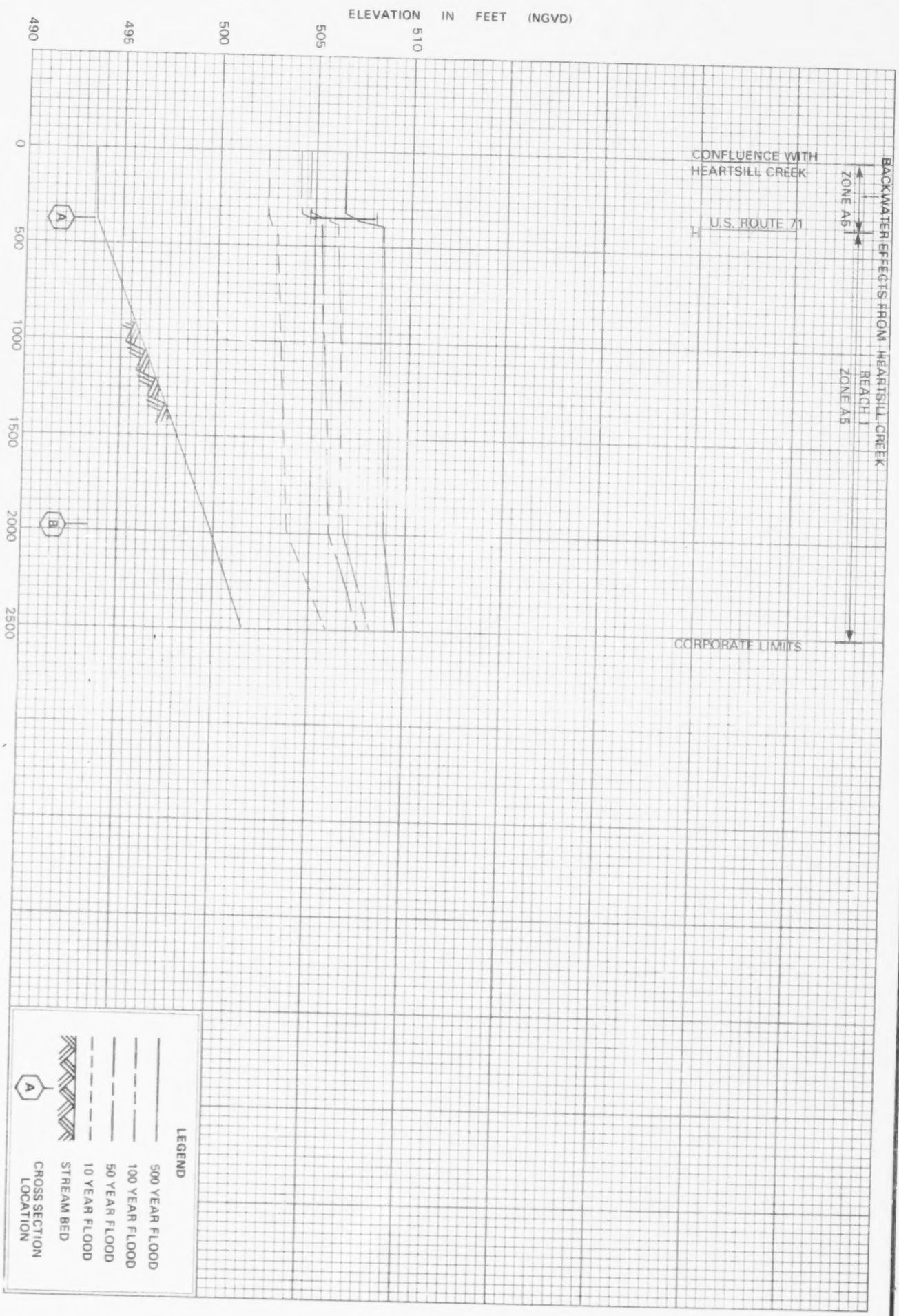
04P

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

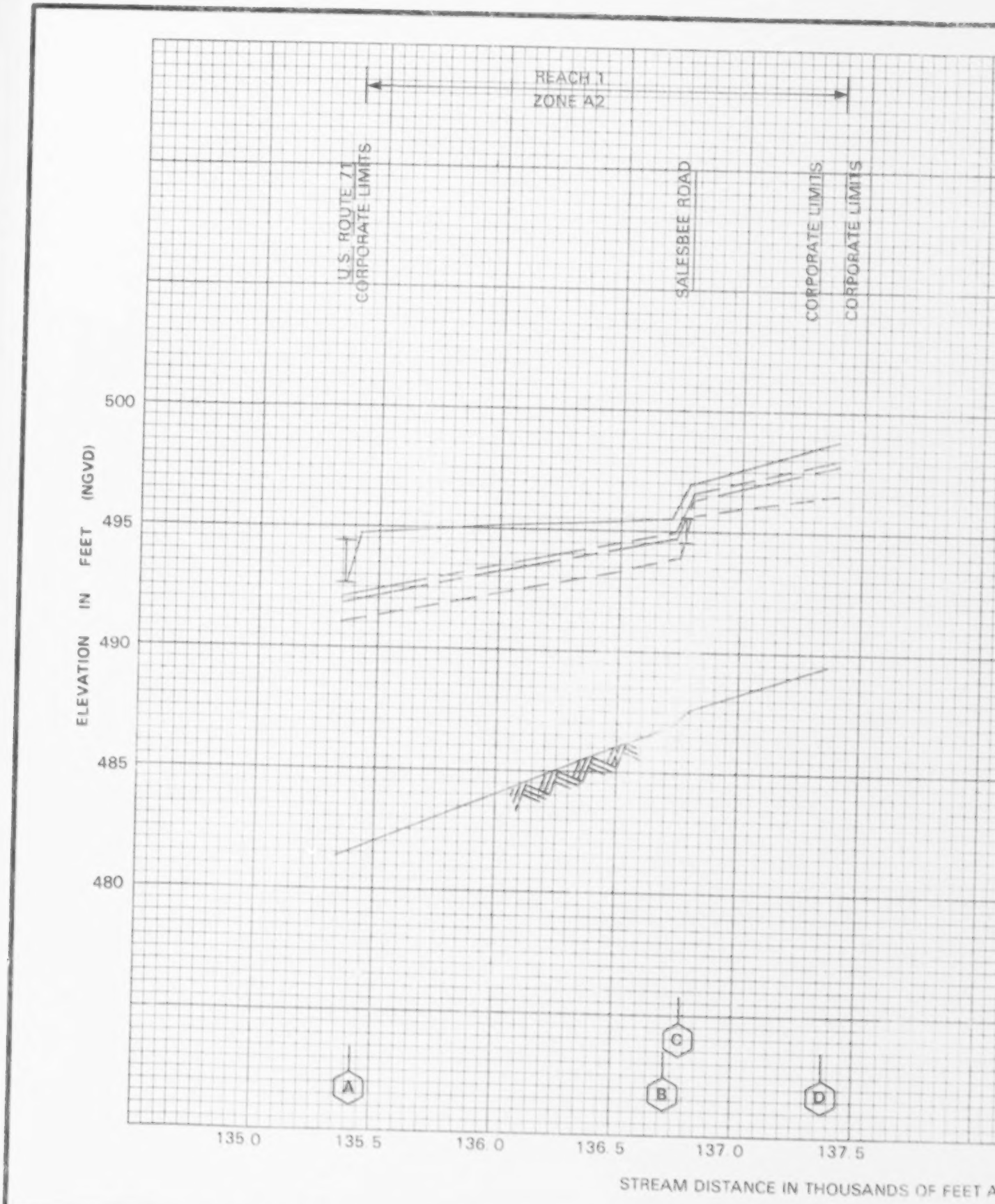
CITY OF GREENWOOD, AR
(SEBASTIAN COUNTY)

FLOOD PROFILES

HEARTSILL CREEK



05P	FEDERAL EMERGENCY MANAGEMENT AGENCY Federal Insurance Administration **CITY OF GREENWOOD, AR** (SEBASTIAN COUNTY)	**FLOOD PROFILES** **HESTER CREEK**


REACH 1
ZONE A2
U.S. ROUTE 71
CORPORATE LIMITS
SALESBEE ROAD
CORPORATE LIMITS
CORPORATE LIMITS
ELEVATION IN FEET (NGVD)
500
495
490
485
480
A
B
C
D
135.0
135.5
136.0
136.5
137.0
137.5
STREAM DISTANCE IN THOUSANDS OF FEET A

OVE MOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

CITY OF GREENWOOD, AR
(SEBASTIAN CO.)

FLOOD PROFILES

ADAMSON'S CREEK

06P